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L14	L13 ((control$ near2 speed$) with engine).clm. and fourth and air$.clm.	452	L14
L13	L10 OR L11 OR L12	25	L13
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L12	(4489680 | 4410032 | 4186694 | 4124066 | 4133185 | 3963070 | 3872842 | 3377023 | 4854459)![PN]	9	L12
L11	("4779577")[PN]	1	L11
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L7	318/42;417/29.ccls.	178	L7
L6	L5 and (fourth adj2 (value or data or number or information))	17	L6
L5	((control$ near2 speed$) with engine).clm. and fourth and air$.clm. and	318	L5

@ad<=20030128

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L4	((control$ near2 speed$) with engine).clm. and fourth.clm and air$.clm.	0	L4
L3	((control$ near2 speed$) with engine).clm. and fourth.clm and air$.clm. and @ad<=20040127	0	L3
L2	((control$ near2 speed$) with engine).clm. and fourth.clm and air$.clm. and @pd<=20040127	0	L2
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L9: Entry 1 of 1 File: USPT Oct 25, 1988

US-PAT-NO: 4779577
DOCUMENT-IDENTIFIER: US 4779577 A

TITLE: Cooling air flap and blower control for motor vehicles

DATE-ISSUED: October 25, 1988

INVENTOR-INFORMATION:

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DATE FILED: December 2, 1986

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COUNTRY	APPL-NO	APPL-DATE
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TYPE	IPC	DATE
CIPS	F01 P 7/02	20060101
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CIPS	F01 P 7/12	20060101
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US-CL-ISSUED: 123/41.05; 123/41.12, 165/98
US-CL-CURRENT: 123/41.05; 123/41.12, 165/98

FIELD-OF-CLASSIFICATION-SEARCH: 123/41.04, 123/41.05, 123/41.06, 123/41.58, 123/41.12, 165/98
See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

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	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	3377023	April 1968	Costa et al.	236/35
☐	3872842	March 1975	Medley	123/41.58 X
☐	3963070	June 1976	Alley et al.	165/98
☐	4124066	November 1978	Taylor	123/41.58 X
☐	4133185	January 1979	Dickey	62/179
☐	4186694	February 1980	Koseki	123/41.58 X
☐	4410032	October 1983	Mori	123/41.58 X
☐	4489680	December 1984	Spokas et al.	123/41.05
☐	4854459	December 1974	Stimeling	165/98 X

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FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
1207710	December 1965	DE	
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3211793	November 1985	DE	

OTHER PUBLICATIONS

"Automatishe Temperaturregelung in Kuhlkreislaufen von Verbrennungsmotoren", Mtz, 20, vol. 5, May 1969, pp. 137-142.

ART-UNIT: 346

PRIMARY-EXAMINER: Koczo; Michael

ASSISTANT-EXAMINER: Cole; Richard R.

ATTY-AGENT-FIRM: Barnes & Thornburg

ABSTRACT:

To control the cooling air requirements of an internal combustion engine and additional assemblies on a motor vehicle, a combination of cooling air flaps adjustable by an electric motor and a ventilator blower whose rpm is adjustable and which are powered by electric motors is used. One closed, one partially open, and one fully open position of the cooling air flaps as well as the rotational speed of the blower are controlled as a function of the cooling requirements of the internal combustion engine and the states of an air conditioner, a temperature of an automatic transmission fluid, a temperature of an intake manifold of the internal combustion engine, and the position of an ignition switch and an engine hood

contact switch in such fashion that a cooling air stream which changes nearly continuously with the cooling requirements is created in the cooling air duct. Advantageously, in addition to the optimum protection of the system and a favorable fuel consumption, a shortened warmup phase of the internal combustion engine and improved aerodynamics of the motor vehicle are achieved by limiting the throughflow of the internal combustion engine chamber with the cooling air flaps closed or partially open.

30 Claims, 11 Drawing figures

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L9: Entry 1 of 1 File: USPT Oct 25, 1988

DOCUMENT-IDENTIFIER: US 4779577 A
TITLE: Cooling air flap and blower control for motor vehicles

Abstract Text (1):
To control the cooling air requirements of an internal combustion engine and additional assemblies on a motor vehicle, a combination of cooling air flaps adjustable by an electric motor and a ventilator blower whose rpm is adjustable and which are powered by electric motors is used. One closed, one partially open, and one fully open position of the cooling air flaps as well as the rotational speed of the blower are controlled as a function of the cooling requirements of the internal combustion engine and the states of an air conditioner, a temperature of an automatic transmission fluid, a temperature of an intake manifold of the internal combustion engine, and the position of an ignition switch and an engine hood contact switch in such fashion that a cooling air stream which changes nearly continuously with the cooling requirements is created in the cooling air duct. Advantageously, in addition to the optimum protection of the system and a favorable fuel consumption, a shortened warmup phase of the internal combustion engine and improved aerodynamics of the motor vehicle are achieved by limiting the throughflow of the internal combustion engine chamber with the cooling air flaps closed or partially open.

Application Filing Date (1):
19861202

Brief Summary Text (3):
Recent developments in motor vehicles, especially automobiles, in very recent times have increasingly reflected the standpoint of optimal aerodynamic design, especially to increase driving performance and reduce fuel consumption. One important factor in this regard is the throughflow required through the engine compartment to cool the engine, which has a negative effect on the so-called coefficient of air resistance. It is also desirable for the engine, following a starting procedure from the cold state, to warm up rapidly to an operating temperature at which it can operate with optimum economy and service life, and to keep the latter as constant as possible during operation.

Brief Summary Text (4):
German OS No. 32 11 793 teaches a coolant temperature regulatinig system for a motor vehicle engine which, in addition to the conventional coolant temperature regulation using a thermostat in a bypasss circuit for the coolant for the engine and the cooling air blower which is switched on and off by a thermostat, additionally controls a shutter in an opening in the car body through which cooling air flows.

Brief Summary Text (5):
It is true that this deals with the requirement to improve aerodynamics. However, the controlling elements used all exhibit more or less of a two-point characteristic so that the operating temperature of the engine cannot be kept constant at a required level. The resulting constant fluctuations around a set

operating point produce a poor quality of regulation and hence load and wear on the engine, including all the assemblies and parts traversed by the cooling water. In addition, the adjusting element of the shutter, which is designed as an element made of expanding material and is affected only by the coolant, cannot be set sufficiently accurately and permits no additional parameters to adjust the cooling air stream to the cooling air needs of the engine and auxiliary or additional assemblies.

Brief Summary Text (6):
To improve the quality of regulation, combined regulating systems with continually operating adjusting elements have been proposed "Motortechnische Zeitschrift", Volume 20, No. 5, May 1959, pages 141 to 142. These hydraulically or hydrostatically operating systems however, are extremely cumbersome and expensive; their use is admissible only when the internal combustion engine already has a pressurized oil supply. Another problem is the compressed oil leaks which are always present in hydraulic or hydrostatic systems.

Brief Summary Text (8):
An object of the invention is to provide an improved coolant and blower control for motor vehicles which optimally regulates the temperature environment of an internal combustion engine including its auxiliary and additional assemblies of acceptable cost and also fully takes into account the aerodynamic aspects of the motor vehicle.

Detailed Description Text (17):
Electric motor 12, which serves to drive the cooling air flaps and is provided with the drive is controlled by control unit 15 via a relay 58 and control disk 14 which is nonrotatably connected with a (symbolically shown) output shaft 59 of transmission 13. Electric motor 12 has one of its terminals connected to ground; the other terminal is supplied via a moving contact 60 of relay 50 in the controlled state with the positive terminal (+) and hence with operating voltage. In the noncontrolled state, moving contact 60 is connected to ground, so that the armature winding of motor 12 is short-circuited and a braking action is achieved. Sliding contacts 60 to 64, which are mounted in a fixed manner, have a frictional connection with control disk 14 which is made circular; control disk 14 has a circular contact path 65 with which the first sliding contact 61 is in electrically conducting contact on an inner path 66, the second sliding contact 62 is in contact on a middle path 67, and the third and fourth sliding contacts 63 and 64 are in contact on an outer path 68. In the area of the inner (66) and outer (68) circular paths of contact path 65, an insulating surface 69, 70, which becomes effective within a limited rotational angle range, is located which interrupts the electrical connection between contact path 65 and the first 61, third 63, and fourth 64 sliding contacts.

Detailed Description Text (18):
The first, third, and fourth sliding contacts 61, 63, 64 are connected with outputs 71, 72, 73 of control device 15, by which the cooling air flaps can be controlled to assume a closed (xk0=0%), partially open (xk1=30%), and fully open (xk2=100%) position xk. The second sliding contact 62 is in the exciting circuit of relay 58, whose exciting winding 74 is connected on one side permanently to the positive terminal (+) of battery 33.

Detailed Description Text (20):
Starting with the position shown, in which the cooling air flaps are closed, we will presume for example, that the partially open position is to be assumed. Control device 15 for this purpose connects output 72 to ground potential which is transmitted by third sliding contact 63 via contact path 65 to second sliding contact 62, so that exciting winding 74 of relay 58 is connected on one side to ground and on the other side to the positive terminal (+). Relay 58 pulls in, whereupon electric motor 12 and control disk 14 with it (and of course the cooling

air flaps as well) are set in motion (rotary motion counterclockwise). The rotary motion is continued until insulating area 70 assumes an angular position in which fixed third sliding contact 63 is located; here it breaks the conducting link between third sliding contact 63 and contact strip 65 so that relay 74 drops out and the motor is braked to a stop. The fully open position and the closed position are reached by appropriately controlling the first 61 and fourth 64 sliding contacts. The adjustment from one position to another as a result of the fixed single direction of rotation is always in the following sequence: closed--partially open-fully open--closed.

Detailed Description Text (27):
FIG. 4 shows the relationship .mu.g=fgt(tm) of the scanning ratio to the control of fan blower 18, 43, 44 as a function of engine temperature tm. However, it is not the scanning ratio itself which is plotted on the ordinate of the graph as the controlling value but the voltage .mu.g, scaled in volts, which appears at the terminals of the fan at a certain scanning ratio. Up to a first temperature threshold tmg1 the blowers are operated for increasing values of engine temperature tm up to the second temperature threshold tmg1 with a voltage .mu.g which increases linearly with temperature from .mu.g1=6 volts to .mu.g2=9 volts. When the second temperature threshold tmg2 is reached, voltage .mu.g is lowered from .mu.g2=9 volts to .mu.g3=7 volts, to be raised to the full onboard line voltage of .mu.g max=12 volts at higher values of the engine temperature tm up to a fourth temperature threshold tmg4; above this value the control voltage of .mu.g max=12 volt is retained.

Detailed Description Text (29):
The special nature of the control curve shown in FIG. 4 lies in the fact that the voltage .mu.g for controlling the blowers is lowered by approximately 2 volts precisely when the cooling air flaps are moved from their partially open position xk1=30% to their fully open position xk2=100%. The lowering of the blower voltage .mu.g and the resultant lowering of the blower rpm means that in the temperature interval between first temperature threshold tmg1 and fourth temperature threshold tmg4, despite the intermediate opening of the cooling air flaps by about 70%, a cooling air stream which increases continuously with engine temperature tm is obtained in the cooling air duct. By avoiding a cooling air stream that changes abruptly, a good regulating behavior is obtained and continuous switching back and forth between the partially and fully open cooling air flap positions is avoided.

Detailed Description Text (30):
Finally, FIG. 5 shows a control curve (xk=fkp(p)), which shows the cooling air flap position xk in percent as a function of pressure p of the coolant in the air conditioner (measured in bars). Above a first pressure threshold pg1 of about 3.5 bars the flaps are moved into partially open position xk1. This position is maintained up to a second pressure threshold pg2 at about 15 bars and raised to 100% for higher pressures p. If pressure p drops off again, the cooling air flap position xk will remain at 100% up to a third pressure threshold pg3 (12 bars) and is then adjusted to 30% down to a fourth pressure threshold pg4 (3 bars). Below the fourth pressure threshold value pg4, which is at about 3 bars, the flaps remain closed.

Detailed Description Text (31):
FIG. 6 again shows the voltage .mu.g (in volts) of the blower as a function .mu.g=fgp(p) of pressure p. For rising pressures, the blower is initially not controlled up to a first pressured threshold pg1. Above pressure threshold pg1 and up to a second pressure threshold pg2, control is accomplished with a voltage .mu.g4 of about 8.5 volts, which is raised above the second pressure threshold pg2 up to a fifth pressure threshold pg5 (at about 19 bars) linearly up to the maximum onboard line voltage of .mu.g max=12 volts; here it remains for higher pressures p. For falling pressures p the control curve .mu.g=fgp(p) runs

parallel with that for rising pressures and remains at a voltage of .mu.g4=8.5 volts down to below the first pressure threshold pg1. Below a fourth pressure threshold pg4 at about 3 bars the blower is switched off once again.

CLAIMS:

1. A cooling air control system for motor vehicles of the type having cooling air duct means opening to an engine copartment, comprising:

controllable cooling airflap means for controlling the size of the flow opening in the cooling air duct means;

controllable speed fan means for controlling the flow of air supplied by the cooling air duct means;

electric motor driven airflap control means for controlling the airflap means in response to detected cooling air requirements to selectively move the same; to a closed position, a partially open position or a fully open position; and

rotational speed control means for controlling the rotational speed of the fan means in response to detected cooling air requirements starting in the partially open position of said airflap means.

2. A system according to claim 1, further comprising cooling air requirement detecting means for detecting cooling air requirements.

3. A system according to claim 2, wherein said cooling air requirement detecting means includes means for detecting at least two of (i) engine coolant temperature; (ii) air conditioner refrigerant pressures; (iii) vehicle transmission fluid temperature; and (iv) vehicle engine intake manifold temperature.

4. Cooling air flap and blower control for motor vehicles whose engine compartment is exposable to a cooling air stream by at least one opening terminating in a cooling air duct in the body, whereby the cooling air duct is closable by cooling air flaps whose position can be controlled and at least one heat exchanger and at least one blower with a controllable rotational speed (rpm) are disposed in the cooling air duct, and the position of the cooling air flaps and the rpm of the blower are controllable by a contorl means as a function of a cooling requirement of systems of the motor vehicle such that when the cooling requirement increases the cooling air flaps are intially moved into an open position and as the cooling air requirement rises further, the blower is additionally controlled, wherein said control means controls an electric motor to move said cooling air flaps, depending on the cooling requirements, to a closed position (zk=kz0), a partially open position (sk--zk2) and a fully open position, and controls the rpm of said blower, starting in the partially open position of said cooling air flaps so that a cooling air stream which changes approximately continuously proportionally with the cooling requirements is obtained in a cooling air duct.

5. Cooling air flap and blower control according to claim 4, wherein the cooling requirements are derived from at least one of the following values:

temperature (tm) of a coolant in an internal combustion engine;

pressure (p) in a coolant circuit of an air conditioner; and

temperature (ts) of an intake manifold of the internal combustion engine, whereby when the cooling requirement is determined by more than one value, that value is used for control which implies the highest controlling value (xk, .mu.g) for cooling air flaps or blower.

6. Cooling air flap and blower control according to claim 5, wherien said control means includes control curves (xk=fkt(tm), xk=fkp(p), .mu.g=fgt(tm), .mu.g=fgp(p)), which have hysteresis defining:

cooling air flap adjustment (xk0 as a function of temperature (tm) or pressure (p); and

motor drive voltage value (.mu.g) set by a scanning ratio to control blower as a function of temperature (tm) and/or pressure (p) and the voltage values (.mu.g) which increase of themselves along with the independent variables, (tm), at least in control curve (.mu.g=fgt(tm)), are lowered by a certain amount at that temperature (tm) at which cooling air flaps swivel from partially open position (sk1) to fully open position (xk2).

7. Cooling air flap and blower control according to claim 6, wherein some control curves (xk=fkt(tm), xk=fkp+(p), .mu.g=fgt(tm), .mu.g=(FGP(p)) are effective only when the ignition is switched on and some control curves (xk=fkp(p), .mu.g=fgp(p)) are effective only when air conditioner is switched on.

8. Cooling air flap and blower control according to claim 7, wherein cooling air flaps (10) are fully open when ignition is switched off.

9. Cooling air flap and blower control according to claim 8, wherein one of said control curves (xk=fkt(tm))13 with rising temperature;

assumes a value (xk=xk0) for the closed position (xk0) of cooling air flaps as long as temperature (tm) is less than a first temperature threshold (tmg1);

assumes a value (xk=xk1) for the partially open position as long as temperature (tm) is greater than or equal to first temperature threshold (tmg1), but is still below a second temperature threshold (tmg2);

with dropping temPerature (tm), remains at this control value (xk=xk2) as long as temperature (tm) has not yet fallen to first temperature threshold (tmg1); and

beyond this value, assumes the value (xk=xk1) for the partially open position (xk1) as long as temperature (tm) has not yet dropped to a third temperature threshold (tmg3), and beyond this value, assumes the value (xk=xk0) for the closed position.

10. Cooling air flap and blower control according to claim 9, wherein one of said control curves (.mu.g=fgt(tm));--with rising temperature (tm)

produces no control of blower as long as temperature (tm) remains below first temperature threshold (tmg1);

assumes a voltage value (.mu.g) which increases linearly between first voltage value (.mu.g1) and a second voltage value (.mu.g2) so long as temperature (tm) is higher than or equal to first threshold (tmg1), but is still below second temperature threshold (tmg2);

on reaching second temperature threshold (tmg2), at which cooling air flaps swivel from the partially open into the fully open position, lowers the voltage (.mu.g) to a third voltage value (.mu.g3), whereby when temperature (tm) increases further, the voltage (.mu.g) is increased linearly until it reaches a value (.mu.g. max.) for the maximum onboard line voltage when a fourth temperature threshold (tmg4) is reached, and retains the latter;--with falling temperature (tm)

starting at a value of temperature (tm) above fourth temperature threshold (tmg4);

initially moves following the same curve until it reaches a second temperature

threshold (tmg2);

then remains at third voltage value (.mu.g3) between second temperature threshold (tmg2) and first temperature threshold (tmg1);

on reaching first temperature threshold (tmg1) lowers the voltage value (.mu.g) to the first voltage value (.mu.g1), at which it remains until it drops to a fifth temperature threshold (tmg5) beyond which no further control of blower is effected.

11. Cooling air flap and blower control according to claim 10, wherein one of said control curves (xk=fkp(p))--with rising pressure (p);

for pressure values (p) is lower than a first pressure threshold (pg1) at the value (xk0) for the closed position of the cooling air flaps, for pressure values (p) is above or equal to first pressure threshold (pg1), but below a second pressure threshold (pg2) at value (xk1) for the partially open position of the cooling air flaps and for pressure values (p) is higher than second pressure threshold (pg2) at the value (xk2) for the fully open position of cooling air flaps, and--for falling values of pressure (p);

from a value above second pressure threshold (pg2) down to a third pressure threshold (pg3) located below second pressure threshold (pg2), remains at value (xk2), for pressure values (p) below or equal to the third pressure threshold (pg3), but higher than a fourth pressure threshold (pg4) located below first pressure threshold (pg1), is at value (xk1) and for pressure values (p) below or equal to fourth pressure threshold (pg4) is at value (xk0) for cooling air flaps.

12. Cooling air flap and blower control according to claim 11, wherein one of said control curves (.mu.g=fgp(p))--with rising pressure (p);

for pressure values (p) below a first pressure threshold (pg1) causes no control of blower;

for pressure values (p) above or equal to first pressure threshold (pg1), but below or equal to second pressure threshold (pg2), runs at a fourth pressure value (.mu.g4);

for pressure values (p) above or equal to second pressure threshold (pg2), but below or equal to a fifth pressure threshold (pg5) located above second pressure threshold (pg2) increases linearly from fourth voltage value (.mu.g4) up to voltage value (.mu.g max.), and remains at this level for even higher values;--for falling values (p)

down to first pressure threshold (pg1), runs on the same curve as for rising pressure values (p) and for pressure values below or equal to first pressure threshold (pg1) but higher than fourth pressure threshold (pg4) remains at fourth voltage value (.mu.g4) and for group values (p) below or equal to fourth pressure threshold (Pg4) produces no control of blower.

13. Cooling air flap and blower control according to claim 12, wherein cooling air flaps are controlled from closed position (xk0) to partially open position (xk1) so long as ignition is switched on and the temperature (tg) of the lubricant in the fluid circuit of the automatic transmission reaches or exceeds a temperature threshold (tgg).

14. Cooling air flap and blower control according to claim 13, wherein blower is energized starting from the noncontrolled state (.mu.g=0), with fourth voltage value (.mu.g4) as soon as ignition is switched on and the temperature (tg) of the lubricant in the fluid circuit of the transmission reaches or exceeds a temperature

threshold (tgg).

15. Cooling air flap and blower control according to claim 14, wherein cooling air flaps are controlled from closed position (xk0) to fully open position (xk2) as soon as ignition is turned off, an engine hood is closed, and the temperature (tm) of internal combustion engine reaches or exceeds a sixth temperature threshold (tm6) and/or the temperature (ts) of intake manifold of internal combustion engine reaches or exceeds a temperature threshold (tsg).

16. Cooling air flap and blower control according to claim 15, wherein blower is energized from the noncontrolled state (.mu.g=0) with first voltage value (.mu.g4), as soon as ignition is switched off, engine hood is closed, and temperature (tm) of internal combustion engine reaches or exceeds sixth temperature threshold (tmg6) and/or temperature (ts) of intake manifold of internal combustion engine reaches or exceeds a temperature threshold (tsg).

17. Cooling air flap and blower control according to claim 16, wherein an electric motor provided with a transmission for actuating cooling air flaps on its transmission output shaft moves a control disk in a nonrotatable fashion for controlling electric motor cooling air flap actuating [system] into its closed (xk0), partially open (xk1) and fully open (xk2) positions (xk), whereupon electric motor is connected with or insulated from a power supply by means of a relay, whose exciting circuit on the one hand is permanently connected to a first terminal (+) of a power supply and on the other hand is connected by a control device by sliding contacts frictionally connected with control disk to a second terminal (negative terminal (-)) of a power supply.

18. Cooling air flap and blower control according to claim 17, wherein control disk is made circular and has a contact part in the form of a circular ring by means of which a first sliding contact enters into an electrically conducting active relationship on an inner circular path, a second sliding contact into a middle circular path and a third and fourth sliding contact into an outer circular path, whereupon an insulating surface, which breaks the electrical operating connection in a limited rotational angle range, is disposed on the inner and outer circular paths and second sliding contact is in the exciting circuit of relay and the first, third, and fourth sliding contacts are connected with a first, second, and third output of the control device which serves to control relay and actuate the cooling air flaps into the closed (xk0) partially open (xk1) and fully open (xk2) positions.

19. Cooling air flap and blower control according to claim 18, wherein the control of the individual cooling air flap positions (xkl, i=0, 1, 2) is subjected to a time limitation, so designed that it is at least sufficient for each adjustment process under difficult conditions.

20. Cooling air flap and blower control according to claim 19, wherein a relay short-circuits said electric motor in the non-excited state.

21. Cooling air flap and blower control according to claim 20, wherein said blower rpm is controlled by a semiconductor switch which is controlled by said control means by a pulse-width-modulated square-wave signal.

22. Cooling air flap and blower control according to claim 20, wherein said control means provide an analog or digital signal to an end stage which converts the latter into a scanning ratio signal to control a semiconductor switch.

23. Cooling air flap and blower control according to claim 22, wherein control means obtains input signals from a cooling water temperature sensor which determines the coolant temperature (tm) of internal combustion engine (3), a temperature sensor which determines the temperature (ts) on the intake manifold of

the internal combustion engine, a hood contact switch which senses the closed position of the flap for sealing engine compartment, and/or a temperature sensor which senses the temperature (tg) of the lubricant of a transmission and/or a pressure sensor in the coolant circuit of an air conditioner and/or a switch for switching the air conditioner on and off and/or a feedback signal indicating the functioning of the blower or semiconductor switch from the end stage and/or a signal from an ignition switch and, as a function thereof, controls three cooling air flap positions (xk0, xk1, xk2) and electronic end stage.

24. Cooling air flap and blower control according to claim 23, wherein the control means monitors and checks itself as well as the connected sensors for their function and checks whether the cooling air flaps have reached their set positions and, if there is a malfunction, initiates emergency functions and stores an error code in a memory area (error memory).

25. Cooling air flap and blower control according to claim 24, wherein when ignition is switched off and hood is open, a safety circuit becomes effective which avoids uncontrolled starting of blower.

26. Cooling air flap and blower control according to claim 25, wherein said control means is capable of diagnosis and has a memory area from which a diagnostic system can read diagnostic data by a diagnostic bus (K, L).

27. Cooling air flap and blower control according to claim 26, wherein said control means triggers a warning lamp in the event of a system defect by an error report line.

28. Cooling air flap and blower control according to claim 27, wherein the blower can continue running only for a limited space of time after ignition is switched off.

29. Cooling air flap and blower control according to claim 28, wherein said control means includes a microprocessor.

30. Cooling air flap and blower control according to claim 29, wherein the two electronic end stages are pulsed staggered one half period apart.

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8. The system as claimed in claim 1, wherein said computation unit (8) receives said fourth value on two different channels, and uses the two values thus received.

9. The system as claimed in claim 1, for supervising the speeds of the engines (2A, 2B, 2C, 2D) of an aircraft fitted with a plurality of engines (2A, 2B, 2C, 2D), which comprises, for each engine (2A, 2B, 2C, 2D) whose speed it supervises, a specific supervising unit (5A, 5B, 5C, 5D) comprising a means of regulation (6), a sensor (7) and a computation unit (8).

10. The system as claimed in claim 9, wherein each of said information sources (3, 4, 9) receives from all the supervising units (5A, 5B, 5C, 5D) the fourth values measured by the sensor (7) of each of said supervising units (5A, 5B, 5C, 5D) and determines its correctness item from these fourth values.

11. The system as claimed in claim 10, wherein, to determine its correctness item, each information source (3, 4, 9): computes all the differences between said fourth values and its value of said aerodynamic parameter; compares the differences with a predetermined threshold value; and deduces therefrom: if at least half of said differences are below said threshold value, that said correctness item equals 1; otherwise, that it equals 0.

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SPEC/"fourth value" AND SPEC/"aerodynamic parameter": 0 patents.

Results of Search in US Patent Collection db for:
((((ACLM/control? AND SPEC/fourth) AND SPEC/aerodynamic) AND SPEC/value) AND

SPEC/parameter): 25 patents.
Hits 1 through 25 out of 25

Jump To

Refine Search | aclm/control? and SPEC/fourth AND

	PAT. NO.	Title
1	7,095,131	Variable speed wind turbine generator
2	6,952,060	Electromagnetic linear generator and shock absorber
3	6,856,039	Variable speed wind turbine generator
4	6,847,128	Variable speed wind turbine generator
5	6,792,758	Variable exhaust struts shields
6	6,745,727	Engine- and vehicle- speed-based engine cooling fan control
7	6,600,240	Variable speed wind turbine generator
8	6,590,633	Stage apparatus and method for producing circuit device utilizing the same
9	6,411,944	Self-organizing control system
10	6,253,144	Vehicle longitudinal force control
11	6,231,011	Satellite angular momentum control system using magnet-superconductor flywheels
12	6,208,497	System and method for servo control of nonlinear electromagnetic actuators
13	6,206,299	Traction enhancing deployment system
14	6,137,187	Variable speed wind turbine generator
15	5,592,195	Information displaying device
16	5,544,053	System and method for the control of shifting of vehicle automatic transmission
17	5,317,937	Control system for vehicle automatic transmission
18	5,313,905	Twin wing sailing yacht
19	4,964,599	System for controlling roll and yaw of an aircraft
20	4,928,638	Variable intake manifold
21	4,786,034	Apparatus for damping courses of movement
22	4,779,577	Cooling air flap and blower control for motor vehicles
23	4,742,473	Finite element modeling system
24	4,639,863	Modular unitary disk file subsystem
25	4,208,591	Gas turbine power plant control apparatus including a turbine load control

system

Results of Search in US Patents Text Collection db for:

(((((ACLM/control? AND SPEC/fourth) AND SPEC/aerodynamic) AND SPEC/value) AND SPEC/parameter) AND ACLM/aircraft?): 0 patents.

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>>>File 25 processing for PD=  : PD=030128
>>>    started at PD=19080000 stopped at PD=19920106
Processing
>>>File 63 processing for PD=  : PD=030128
>>>    started at PD=DATED stopped at PD=19680517
>>>File 81 processing for PD=  : PD=030128
>>>    started at PD=19390728 stopped at PD=19920325
Processing
Processed  10 of  10 files ...
Completed processing all files
          237129  AIRCRAFT?
          153975  FOURTH
         2782839  DATA
          735561  VALUE
          483066  PARAMETER
         1323743  NUMBER?
             831  FOURTH(2N)(((DATA OR VALUE) OR PARAMETER) OR NUMBER?)
         3221086  CONTROL?
         1582189  PD<=030128
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